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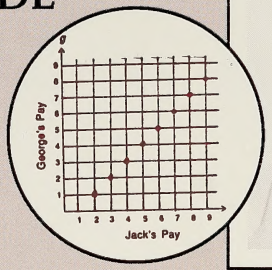
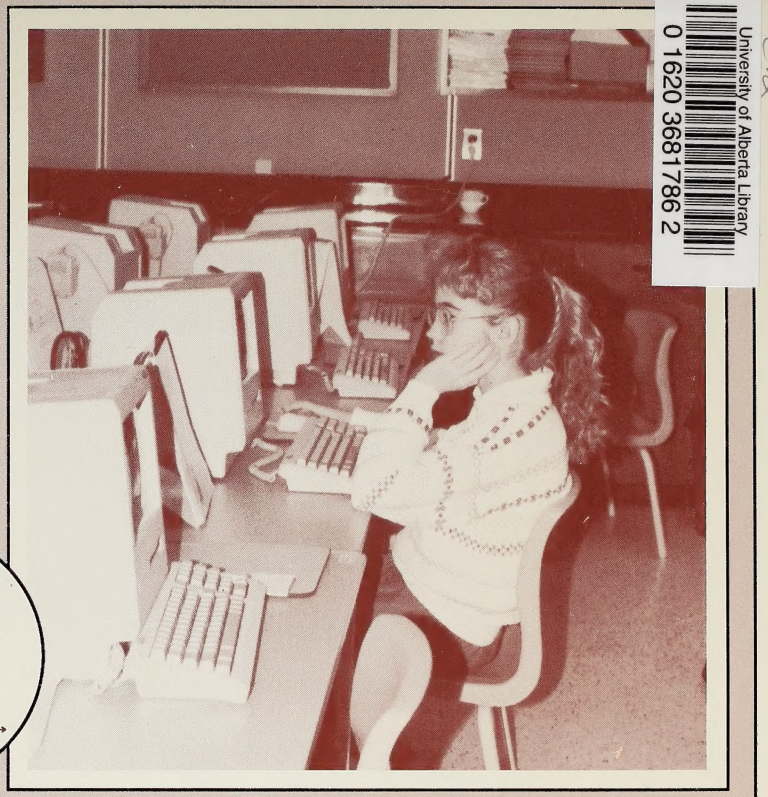
MODULE 4

STUDENT SUPPORT GUIDE





MATHEMATICS 7

Distance Learning

Alberta EDUCATION

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Mathematics 7

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Module 4: Algebra

STUDENT SUPPORT GUIDE

Note to the Parent or Guardian

This Mathematics Student Support Guide contains answers to activities in the accompanying Module Booklet. It should be kept secure by the parent or guardian if the student is under 16 years of age. Younger students should not have access to this Guide except under supervision.

This Student Support Guide does not contain the answers to the accompanying Assignment Booklet. The Assignment Booklet will be graded by the student's distance education teacher.

Mathematics 7
Student Support Guide
Module 4
Algebra
Alberta Distance Learning Centre
ISBN No. 0-7741-0138-5

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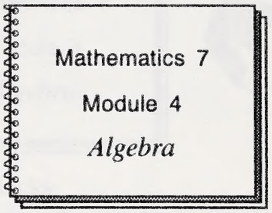
MODULE INTRODUCTION

What Lies Ahead

In this introduction the student will learn the meaning of the term algebra. The student will also learn a little background about the history of algebra.

Gathering Materials

For the Module Introduction the student will need the following item.



Guiding the Student

- Have the student turn to the Module Introduction in the Module Booklet and read "Working Together."
- Next have the student preview the Module Booklet for Module 4.

GETTING SET

What Lies Ahead

This section will pre-test the skills taught in the module to determine the student's strengths and weaknesses.

Gathering Materials

The student will need these items for this section.

- base 10 blocks
- cylinders (Use the cardboard cylinders in rolls of toilet paper, paper towel, etc.)
- cut-out equation scale and operation cards in appendix of this booklet

These learning aids will all be used several times in the module so do not discard them.

Guiding the Student

- Have the student turn to Section 1 in the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Next, have the student view the video or read the notes.
- Then have the student do the pretest independently.
- Afterwards help the student check the answers. Further directions are on the page following the answers. It is **not** necessary for the student to correct any errors.

Pretest

1. Translate each English phrase into a mathematical expression:

   a. four bottles plus six bottles

   b. six metres less than twice the width

2. Use learnings aids (cylinders, operation cards, and base 10 blocks) to do the following:

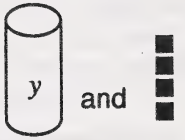
   a. Model $y + 4$ and evaluate if $y = 5$.

Suggested Answers

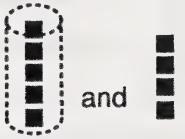
1. a. $4 + 6$

   b. $2w - 6$

2. a. Model $y + 4$.



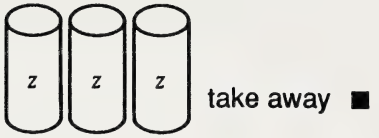
If $y = 5$, replace the cylinders with 5 units.



The result is 9.

b. Model $3z - 1$ and evaluate if $z = 2$.

b. Model $3z - 1$.

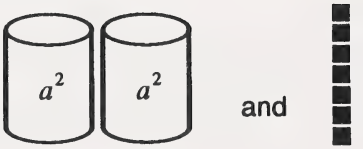


If $z = 2$, replace each cylinder with 2 units.

The result is 5.

c. Model $2a^2 + 7$ and evaluate if $a = 3$.

c. Model $2a^2 + 7$.



If $a = 3$, replace each cylinder with 3^2, 3×3 or 9.

The result is 25.

3. Without using learning aids do the following

a. Evaluate $3 + 4c$ if $c = 5$.

b. Evaluate $2d - 1$ if $d = 1.2$.

c. Evaluate $3(s + t)$ if $s = 2$ and $t = 4$.

d. Evaluate $3xy$ if $x = 0.1$ and $y = 0.4$.

3. a. If $c = 5$, then $3 + 4c$

$= 3 + 4 \times 5$

$= 3 + 20$

$= 23$

b. If $d = 1.2$, then $2d - 1$

$= 2 \times (1.2) - 1$

$= 2.4 - 1$

$= 1.4$

c. If $s = 2$ and $t = 4$, then $3(s + t)$

$= 3(2 + 4)$

$= 3(6)$

$= 18$

d. If $x = 0.1$ and $y = 0.4$, then $3xy$

$= (3)(0.1)(0.4)$

$= 0.12$

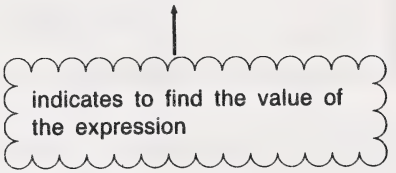
4. What do the equal signs (=) signal in each of the following?

   a. $6 \times 2 - 1 = 11$

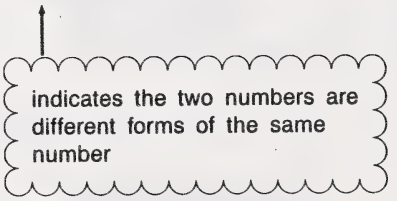
   b. $\frac{4}{5} = 0.8$

   c. $7 + 5 = 3 \times 4 - 1$

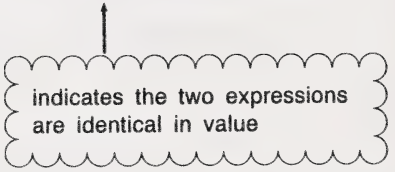
4. a. $6 \times 2 - 1 = 11$



b. $\frac{4}{5} = 0.8$



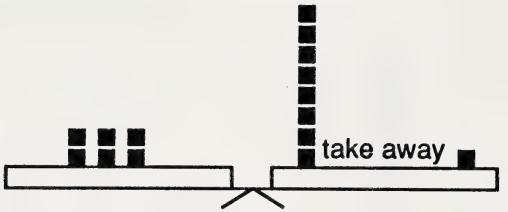
c. $7 + 5 = 3 \times 4 - 1$



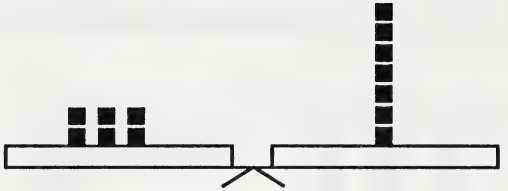
5. Are the following equations? Model each, and then answer "yes" or "no."

   a. $3 \times 2 = 8 - 1$

5. a. Model $3 \times 2 = 8 - 1$.



Simplify each side.

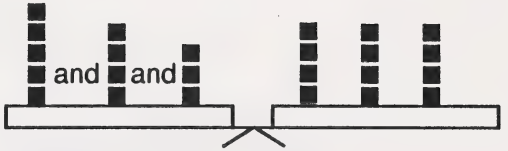


The scale is not balanced. (The LSH = 9 and the RHS = 7.)

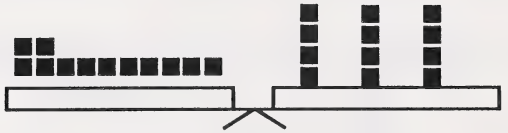
So this is not an equation.

b. $5 + 4 + 3 = 3 \times 4$

b. Model $5 + 4 + 3 = 3 \times 4$.



Simplify each side.



The scale is balanced. (The LHS = 12 and the RHS = 12.)

So this is an equation.

6. Translate each English sentence into an equation:

   a. Five centimetres plus eight centimetres results in thirteen centimetres.

   b. Joseph's age minus four years is eight years.

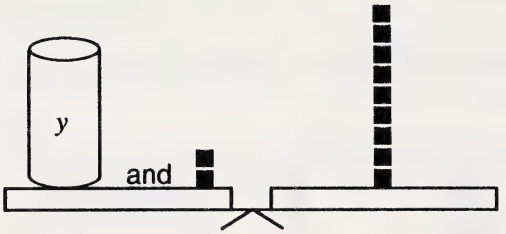
6. a. $5 + 8 = 13$

   b. $a - 4 = 8$

7. Use learning aids (the cut-out scale in the appendix, operation cards, base 10 blocks and cylinders) to do the following:

   a. Model $y + 2 = 9$. Then solve the equation and verify the solution.

7. a. Model $y + 2 = 9$.



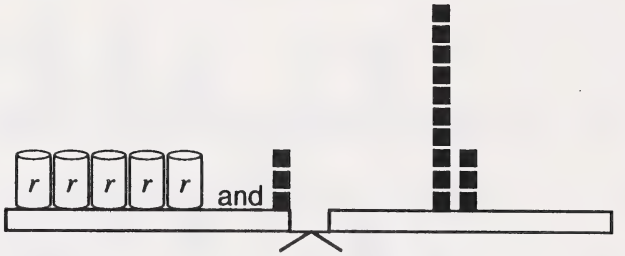
Use guess and check methods to discover the value of y. Try $y = 7$ and check.

The scale is balanced. (The value of each side is 9.)

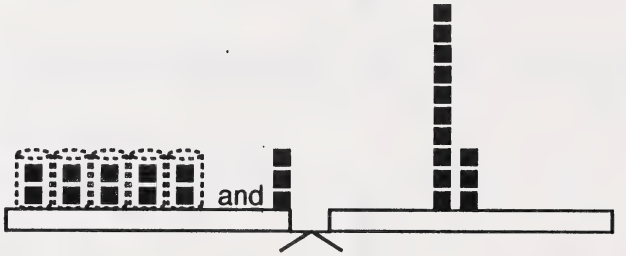
So $y = 7$.

b. Model $5r + 3 = 13$. Then solve the equation and verify the solution.

b. Model $5r + 3 = 13$.



Use guess and check methods to discover the value of r. Try $r = 2$ and check.



The scale is balanced. (The value of each side is 13.)

So $r = 2$.

8. Solve these equations and verify the solutions. Do not use learning aids.

a. $a - 2 = 8$

b. $3b = 27$

8. a. To solve $a - 2 = 8$, think

What number minus 2 is 8?

$\boxed{10} - 2 = 8$

$a = 10$

Check

LHS	RHS
$a - 2$	8
$= 10 - 2$	
$= 8$	

LHS = RHS

So $a = 10$.

b. To solve $3b = 27$, think

3 times what number is 27?

$3 \times \boxed{9} = 27$

$b = 9$

Check

LHS	RHS
$3b$	27
$= 3 \times 9$	
$= 27$	

LHS = RHS

So $b = 9$.

c. $2c + 9 = 17$

d. $4d + 1 = 2.16$

c. To solve $2c + 9 = 17$, think

9 more than 2 times what number is 17?

$2 \times \boxed{4} + 9 = 17$

$c = 4$

Check

LHS	RHS
$2c + 9$	17
$= 2 \times 4 + 9$	
$= 8 + 9$	
$= 17$	

LHS = RHS

So $c = 4$.

d. To solve $4d + 1 = 2.6$, think

1 more than 4 times what number is 2.6?

$4 \times \boxed{0.4} + 1 = 2.6$

$d = 0.4$

Check

LHS	RHS
$4d + 1$	2.6
$= 4 \times 0.4 + 1$	
$= 1.6 + 1$	
$= 2.6$	

LHS = RHS

So $d = 0.4$.

9. Plot the following

a. (2, 5)

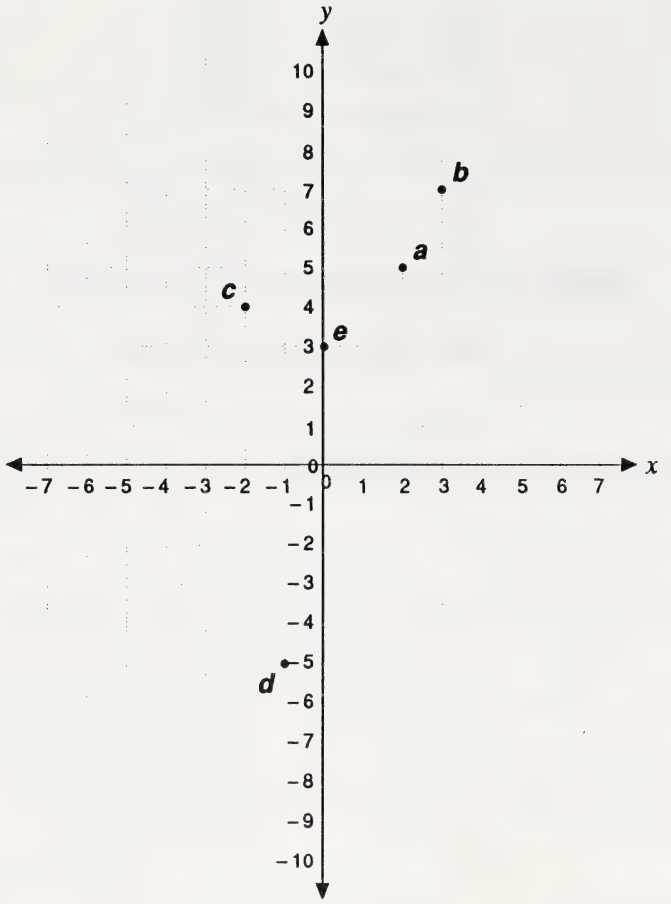
b. (3, 7)

c. (−2, 4)

d. (−1, −5)

e. (0, 3)

9.



10. Jerrit unpacks cans in boxes at a grocery store.

Number of boxes (b)	Relation	Number of cans (c)
1	12 – 1	12
2	12 – 2	24
3	12 – 3	36
4	12 – 4	48
5	12 – 5	60

Describe the relationship several ways:

a. Use words to describe the relationship.

b. Write an equation to describe the relationship.

c. Use order pairs to describe the relationship.

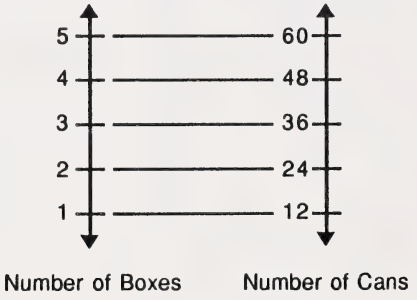
d. Use number lines to describe the relationship.

10. a. The number of cans is 12 times the number of boxes.

b. $c = 12b$

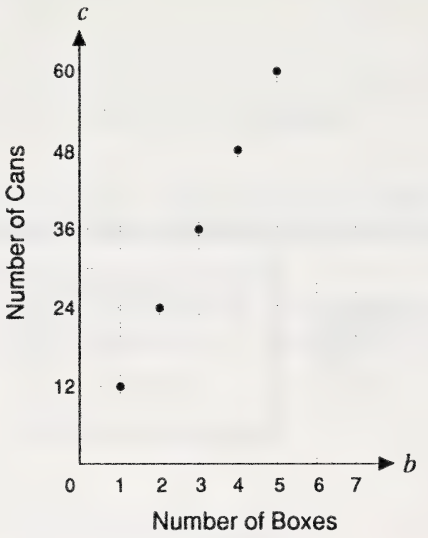
c. (1,12), (2,24), (3,36), (4,48), (5,60)

d. Number lines will vary. Here is one example.



e. Use a graph to describe the relationship.

e.



Guiding the Student

After checking the answers, compare the student's results with the following chart. (The chart lists the skills covered in the Pretest and the section in which the skill will be taught.)

Question	Skill	Section
1	Using variables and expressions to describe practical situations	2
2	Using learning aids to model and evaluate mathematical expressions	3
3	Evaluating expressions for given values of the variables	4
4,5	Understanding concept of equality and equation	5
6	Using equations to describe practical situations	6
7	Using learning aids to model equations, solve equations and verify the solution	6
8	Solving equations by guessing and checking	7
9	Plotting points on a grid	8
10	Describing relations	8

Help the student to decide what to do next. It is recommended that the student does most of the sections which correspond to the questions with which the student experienced difficulties and only the concluding activities in sections which correspond to the questions with which the student experienced success.

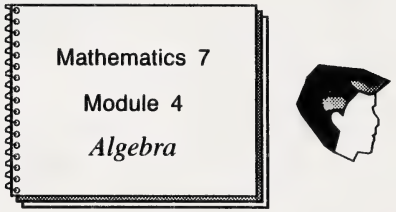
WRITING EXPRESSIONS

What Lies Ahead

In this section the student will translate English words and phrases into mathematical expressions.

Gathering Materials

The student will need this item for this section.



Guiding the Student

- Have the student turn to Section 2 of the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities	Suggested Answers
Translate each English phrase into a mathematical expression.	
1. seven baseballs increased by nine baseballs	1. $7 + 9$
2. the difference between nine poodles and six poodles	2. $9 - 6$
3. five groups of fifteen children	3. 5×15
4. forty-eight pizzas divided by sixteen people	4. $48 \div 16$ or $\frac{48}{16}$
5. three years more than the difference of five years and two years	5. $5 - 2 + 3$
6. thirty-two tapes decreased by eight groups of three tapes	6. $32 - 8 \times 3$

Guiding the Student

- Have the student read "Working Together" and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

Computer Alternative

1. Do Lesson 3 on the Pre-Algebra disk of the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

2. Do Lesson 4 on the Pre-algebra disk of the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Print Alternative

3. Translate the following situations into algebraic expressions.

   a. Marc's age increased by 2

   b. five times the distance from Muriel's house to school

   c. half the price of the car

   d. a number squared

   e. three less than the length

Suggested Answers

1. Computer-checked

2. Computer-checked

3. a. $a + 2$

   b. $5d$

   c. $\frac{1}{2}p$

   d. n^2

   e. $\ell - 3$

Note

Different variables may be used.

4. Translate each of the following situations into an algebraic expression:

   a. twice Omar's salary plus three dollars

   b. one less than two-thirds of a number

   c. four more than one-half of the distance

   d. the difference between eight and a number squared

   e. three more than twice Jason's mass

4. a. $2s + 3$
   or
   $3 + 2s$

   b. $\frac{2}{3} n - 1$

   c. $\frac{1}{2} d + 4$
   or
   $4 + \frac{1}{2} d$

   d. $8 - n^2$

   e. $3 + 2m$
   or
   $2m + 3$

Note

Different variables may be used.

Guiding the Student

- Have the student do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

1. Read the following phrases aloud.

   a. three times four, less two

   b. three times, four less two

   c. the sum of two, and five times three

   d. the sum of two and five, times three

2. How did you translate the commas when you read the phrases in question 1?

3. Mathematicians sometimes use parentheses to show order of operations. Translate each of the expressions in question 1 into a mathematical expression.

Suggested Answers

These phrases are read aloud on the companion audio-cassette.

2. The student should pause at the comma.

3. a. $(3 \times 4) - 2$

   b. $3(4 - 2)$
   or
   $3 \times (4 - 2)$

   c. $2 + (5 \times 3)$

   d. $(2 + 5)(3)$
   or
   $3\ (2 + 5)$
   or
   $(2 + 5) \times 3$
   or
   $3 \times (2 + 5)$

4. Translate each of the following into a mathematical or an algebraic expression:

   a. sixteen times, two plus a number

   b. sixteen times two, plus a number

   c. four times the length, plus eight centimetres

   d. four times, the length plus eight centimetres

4. a. $16\ (2 + n)$

   b. $(16 \times 2) + n$

   c. $4\ \ell + 8$

   d. $4\ (\ell + 8)$

Note

Different variables may be used.

5. Remember subtraction is sometimes translated in a different order. Translate the following:

   a. the difference of three, and two times a number

   b. the difference of three and two, times a number

   c. three less than four, times a number

   d. three less than, four times a number

5. a. $3 - 2n$

   b. $(3 - 2)\ n$

   c. $(4 - 3)\ n$

   d. $4n - 3$

Note

Different variables may be used.

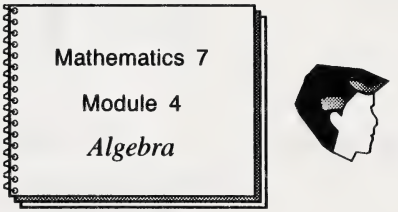
MODELING EXPRESSIONS

What Lies Ahead

In this section the student will use learning aids to model algebraic expressions and evaluate them.

Gathering Materials

The student will need these items for this section.



- base 10 blocks
- cylinders
- cut-out cards from appendix to indicate addition or subtraction

Guiding the Student

- Have the student turn to Section 3 of the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

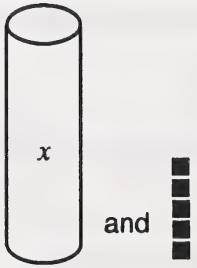
Use cardboard cylinders from rolls of paper towel or rolls of toilet paper, or use cans to represent variables. Use the "and" and "take away" cards from the cut outs in the appendix to indicate addition and subtraction. Use the units from the base ten blocks to represent the numbers that are given.

1. a. Model $x + 5$.

b. Evaluate $x + 5$ if $x = 3$.

Suggested Answers

1. a. Model $x + 5$.



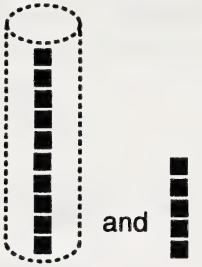
b. To evaluate $x + 5$ if $x = 3$, replace the cylinder with 3.

The result is 8.

c. Evaluate $x + 5$ if $x = 10$.

2. a. Model $y - 2$.

c. To evaluate $x + 5$ if $x = 10$, replace the cylinder with 10.



The result is 15.

2. a. Model $y - 2$.

b. Evaluate $y - 2$ if $y = 5$.

b. To evaluate $y - 2$ if $y = 5$, replace the cylinder with 5.

The result is 3.

■■■

c. Evaluate $y - 2$ if $y = 4$.

c. To evaluate $y - 2$ if $y = 4$, replace the cylinder with 4.

The result is 2.

■■

Guiding the Student

- Have the student read the notes and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

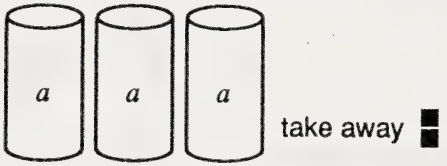
Use cylinders to represent the variables. Use "and" and "take away" cards to indicate the operation. Use the units from base 10 blocks to represent the numbers that are given.

1. a. Model $3a - 2$.

b. Evaluate $3a - 2$ if $a = 5$.

Suggested Answers

1. a. Model $3a - 2$.



b. To evaluate $3a - 2$ if $a = 5$, replace each a with 5.

The result is 13.

c. Evaluate $3a - 2$ if $a = 2$.

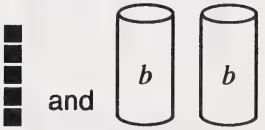
2. a. Model $5 + 2b$.

b. Evaluate $5 + 2b$ if $b = 3$.

c. To evaluate $3a - 2$ if $a = 2$, replace each a with 2.

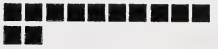
The result is 4.

2. a. Model $5 + 2b$.



b. To evaluate if $b = 3$, replace each cylinder with 3.

The result is 12.



c. Evaluate $5 + 2b$ if $b = 0$.

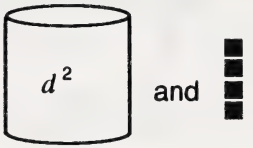
3. a. Model $d^2 + 4$.

b. Evaluate $d^2 + 4$ if $d = 5$.

c. To evaluate if $b = 0$, replace each cylinder with 0.

The result is 5.

3. a. Model $2d^2 + 4$.



b. To evaluate $d = 5$, replace each cylinder with 5^2, or 25.

The result is 29.

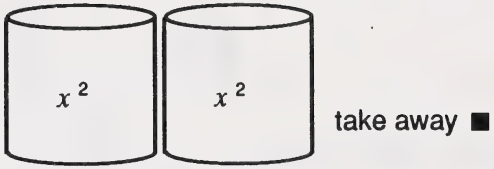
c. Evaluate $d^2 + 4$ if $d = 3$.

4. a. Model $2x^2 - 1$.

c. To evaluate if $d = 3$, replace each cylinder with 3^2 or 9.

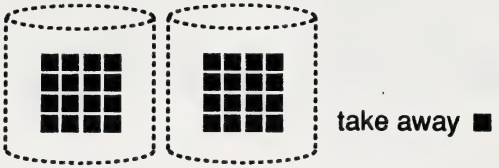
The result is 13.

4. a. Model $2x^2 - 1$.



b. Evaluate $2x^2 - 1$ if $x = 4$.

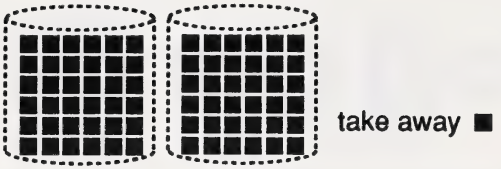
b. To evaluate if $x = 4$, replace each cylinder with 4^2, 4×4, or 16.



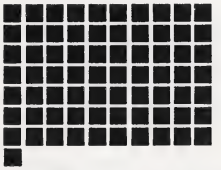
The result is 31.

c. Evaluate $2x^2 - 1$ if $x = 6$.

c. To evaluate if $x = 6$, replace each cylinder with 6^2, 6×6, or 36.



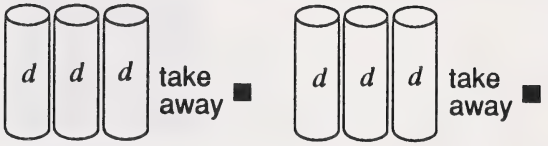
The result is 71.



5. a. Model $2(3d - 1)$.

b. Evaluate $2(3d - 1)$ if $d = 5$.

5. a. Model $2(3d - 1)$.



b. To evaluate if $d = 5$, replace each cylinder with 5.

The result is 22.

c. Evaluate $2(3d - 1)$ if $d = 2$.

c. To evaluate if $d = 2$, replace each cylinder with 2.

The result is 10.

Guiding the Student

- Have the student read "Working Together" and do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

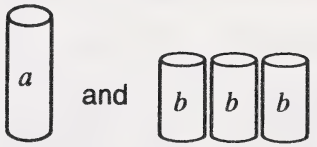
Use cylinders to represent the variables. Use the "and" and "take away" cards to indicate the operation. Use the units from base 10 blocks to represent the numbers that are given.

1. a. Model $a + 3b$.

b. Evaluate $a + 3b$ if $a = 1$ and $b = 2$.

Suggested Answers

1. a. Model $a + 3b$.



b. To evaluate if $a = 1$ and $b = 2$, replace a with 1 and b with 2.

The result is 7.

■■■■■■■

c. Evaluate $a + 3b$ if $a = 2$ and $b = 1$.

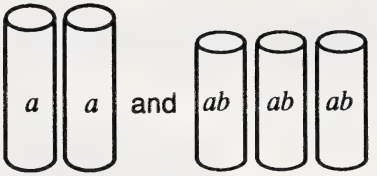
2. a. Model $2a + 3ab$.

c. To evaluate if $a = 2$ and $b = 1$, replace a with 2 and b with 1.

The result is 5.

■■■■■

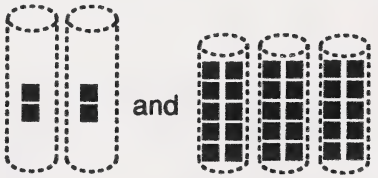
2. a. Model $2a + 3ab$.



b. Evaluate $2a + 3ab$ if $a = 2$ and $b = 5$.

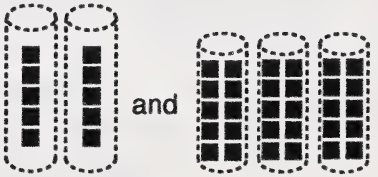
c. Evaluate $2a + 3ab$ if $a = 5$ and $b = 2$.

b. To evaluate $2a + 3ab$ if $a = 2$ and $b = 5$, replace a with 2 and ab with 2×5, 2 groups of 5 or 10.

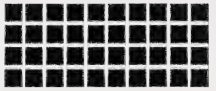


The result is 34.

c. To evaluate $2a + 3ab$ if $a = 5$ and $b = 2$, replace a with 5 and ab with 5×2, 5 groups of 2, or 10.



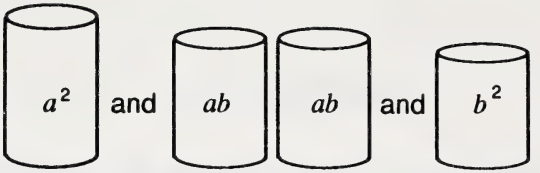
The result is 40.



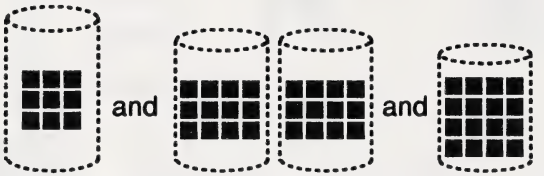
3. a. Model $a^2 + 2ab + b^2$.

b. Evaluate $a^2 + 2ab + b^2$ if $a = 4$ and $b = 3$.

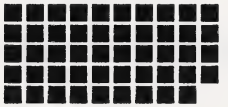
3. a. Model $a^2 + 2ab + b^2$.



b. To evaluate $a^2 + 2ab + b^2$ if $a = 4$ and $b = 3$, replace a^2 with 3^2, 3×3 or 9, replace ab with 4×3, or 12 and replace b^2 with 4^2, 4×4 or 16.



The result is 49.



c. Evaluate $a^2 + 2ab + b^2$ if $a = 1$ and $b = 0$.

c. Evaluate $a^2 + 2ab + b^2$ if $a = 1$ and $b = 0$.
Replace a^2 with 1^2, 1×1 or 1. Replace ab with 1×0 or 0. Replace b^2 with 0^2, 0×0 or 0.

The result is 1.

■

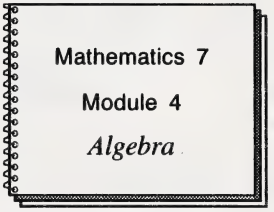
EVALUATING EXPRESSIONS

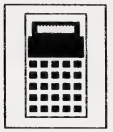
What Lies Ahead

In this section the student will learn to evaluate expressions without learning aids.

Gathering Materials

The student will need these items for this section.





Computer Drill & Instruction: Mathematics, Level D, Lesson 5 of Pre-Algebra disk.

Guiding the Student

- Have the student turn to Section 4 of the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

Computer Alternative

1. Do Lesson 5 of the Pre-Algebra disk from the package *Computer Drill and Instruction: Mathematics, Level D* (SRA).

   Remember if you need help press the SHIFT key and the ? key.

Print Alternative

2. a. Evaluate $n + 10$ if $n = 8$.

   b. Evaluate $2p$ if $p = 0.6$.

   c. Evaluate $5r - 2$ if $r = 7$.

Suggested Answers

1. Computer-checked

2. a. If $n = 8$, then $n + 10$

   $= 8 + 10$
   $= 18$

   b. If $p = 0.6$, then $2p$

   $= (2)(0.6)$
   $= 1.2$

   c. If $r = 7$, then $5r - 2$

   $= (5)(7) - 2$
   $= 35 - 2$
   $= 33$

d. Evaluate $3 + 4s$ if $s = 0.5$.

d. If $s = 0.5$, then $3 + 4s$

$= 3 + 4(0.5)$
$= 3 + 2$
$= 5$

e. Evaluate $2n^2 + 1$ if $n = 4$.

e. If $n = 4$, then $2n^2 + 1$

$= 2(4^2) + 1$
$= 2\ (4 \times 4) + 1$
$= 2(16) + 1$
$= 32 + 1$
$= 33$

f. Evaluate $0.5n - 0.1$ if $n = 2$.

f. If $n = 2$, then $0.5n - 0.1$

$= (0.5)(2) - 0.1$
$= 1 - 0.1$
$= 0.9$

Guiding the Student

- Have the student read "Working Together" and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

1. a. Evaluate $3a + 2b$ if $a = 2$ and $b = 7$.

   b. Evaluate $p^2 - q^2$ if $p = 4$ and $q = 3$.

   c. Evaluate $a^2 + 5ab - 6b^2$ if $a = 3$ and $b = 2$.

   d. Evaluate $3(s + t)$ if $s = 0.2$ and $t = 0.5$.

Suggested Answers

1. a. If $a = 2$ and $b = 7$, then $3a + 2b$

   $= 3(2) + 2(7)$
   $= 6 + 14$
   $= 20$

   b. If $p = 4$ and $q = 3$, then $p^2 - q^2$

   $= 4^2 - 3^2$
   $= (4)(4) - (3)(3)$
   $= 16 - 9$
   $= 7$

   c. If $a = 3$ and $b = 2$, then $a^2 + 5ab - 6b^2$

   $= 3^2 + (5)(3)(2) - 6(2^2)$
   $= (3)(3) + (5)(3)(2) - 6(2)(2)$
   $= 9 + 30 - 24$
   $= 39 - 24$
   $= 15$

   d. If $s = 0.2$ and $t = 0.5$, then $3(s + t)$

   $= 3(0.2 + 0.5)$
   $= 3(0.7)$
   $= 2.1$

Remember rules for order of operations.

2. Evaluate the following for $a = 4$, $b = 3$, $c = 2$.

a. $a + (b + c)$ and $(a + b) + c$

b. $a\,(b + c)$ and $ab + ac$

c. $(a + b)(a - b)$ and $a^2 - b^2$

2. a. If $a = 4$, $b = 3$, $c = 2$, then

$$\begin{aligned} & a + (b + c) \\ &= 4 + (3 + 2) \\ &= 4 + 5 \\ &= 9 \end{aligned}$$

and

$$\begin{aligned} & (a + b) + c \\ &= (4 + 3) + 2 \\ &= 7 + 2 \\ &= 9 \end{aligned}$$

b. If $a = 4$, $b = 3$, $c = 2$, then

$$\begin{aligned} & a\,(b + c) \\ &= 4\,(3 + 2) \\ &= 4 \times 5 \\ &= 20 \end{aligned}$$

and

$$\begin{aligned} & ab + ac \\ &= (4)(3) + (4)(2) \\ &= 12 + 8 \\ &= 20 \end{aligned}$$

c. If $a = 4$, $b = 3$, $c = 2$, then

$$\begin{aligned} & (a + b)(a - b) \\ &= (4 + 3)(4 - 3) \\ &= (7)(1) \\ &= 7 \end{aligned}$$

and

$$\begin{aligned} & a^2 - b^2 \\ &= 4^2 - 3^2 \\ &= (4)(4) - (3)(3) \\ &= 16 - 9 \\ &= 7 \end{aligned}$$

d. $\frac{ab + ac}{a}$ and $b + c$

e. $(a + b)(a + b)$ and $a^2 + 2ab + b^2$

3. What did you notice about question 2?

d. If $a = 4$, $b = 3$, $c = 2$, then

$$\frac{ab + ac}{a} = \frac{(4)(3) + (4)(2)}{4} = \frac{12 + 8}{4} = \frac{20}{4} = 5$$

and

$$b + c = 3 + 2 = 5$$

e. If $a = 4$, $b = 3$, $c = 2$, then

$$(a + b)(a + b) = (4 + 3)(4 + 3) = 7 \times 7 = 49$$

and

$$a^2 + 2ab + b^2 = 4^2 + (2)(4)(3) + 3^2 = (4)(4) + (2)(4)(3) + (3)(3) = 16 + 24 + 9 = 49$$

3. Notice each pair of expressions is equal.

Guiding the Student

- Have the student read "Working Together" and do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

1. Complete the following tables. (Evaluate the first 3 values and use a pattern to help you find the last 3 values.)

a.

a	$a + 2$
1	
2	
3	
4	
5	
6	

b.

b	$b - 1$
1	
2	
3	
4	
5	
6	

Suggested Answers

a.

a	$a + 2$	Pattern
1	3	
2	4	+1
3	5	+1
4	6	+1
5	7	+1
6	8	+1

b.

b	$b - 1$	Pattern
1	0	
2	1	+1
3	2	+1
4	3	+1
5	4	+1
6	5	+1

c.

c	$3c$
1	
2	
3	
4	
5	
6	

d.

d	$3d + 2$
1	
2	
3	
4	
5	
6	

c.

c	$3c$	Pattern
1	2	
2	4	+2
3	6	+2
4	8	+2
5	10	+2
6	12	+2

d.

d	$3d + 2$	Pattern
1	5	
2	8	+3
3	11	+3
4	14	+3
5	17	+3
6	20	+3

e.

f	$5f - 1$
1	
2	
3	
4	
5	
6	

e.

f	$5f - 1$	Pattern
1	4	
2	9	+5
3	14	+5
4	19	+5
5	24	+5
6	29	+5

2. Complete the following tables. (Evaluate the first 3 variables and use a pattern to help you find the last 3 values.)

a.

a	a^2
1	
2	
3	
4	
5	
6	

2. a.

a	a^2	Pattern
1	1	
2	4	+3, +2
3	9	+5, +2
4	16	+7, +2
5	25	+9, +2
6	36	+11

b.

b	$b^2 + 3$
1	
2	
3	
4	
5	
6	

c.

c	$c^2 - 1$
1	
2	
3	
4	
5	
6	

b.

b	$b^2 + 3$	Pattern
1	4	
2	7	+ 3, + 2
3	12	+ 5, + 2
4	19	+ 7, + 2
5	28	+ 9, + 2
6	39	+ 11

c.

c	$c^2 - 1$	Pattern
1	0	
2	3	+ 3, + 2
3	8	+ 5, + 2
4	15	+ 7, + 2
5	24	+ 9, + 2
6	35	+ 11

3. What did you notice about the patterns in questions 1 and 3?

3. In Question 1, the exponent of the variable was **one**, and you found the difference once to obtain the pattern. In Question 2, the exponent of the variable was **two**, and you found the difference **twice** to obtain the pattern.

   The number of times you can find the difference is related to the exponent of the variable.

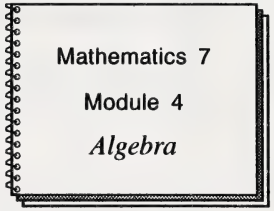
EQUALITY AND EQUATIONS

What Lies Ahead

In this section the student will develop his or her understanding of equality and equations.

Gathering Materials

The student will need these items for this section.



- base 10 blocks
- cut out operation cards
- cylinders

Guiding the Student

- Have the student turn to Section 5 of the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

1. What do the equal signs signal in each of the following?

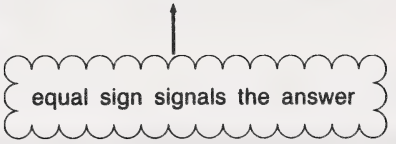
   a. $5 \times 3 + 2 = 17$

   b. $\frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}$

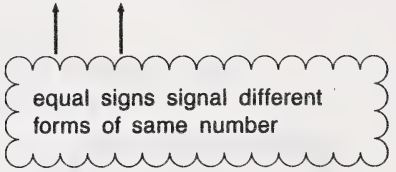
   c. $4 + 3 + 2 = 3 \times 3$

Suggested Answers

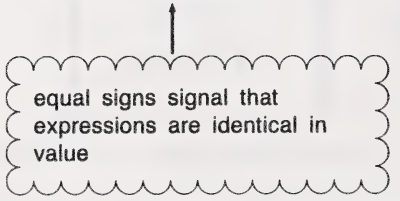
1. a. $5 \times 3 + 2 = 17$



b. $\frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}$



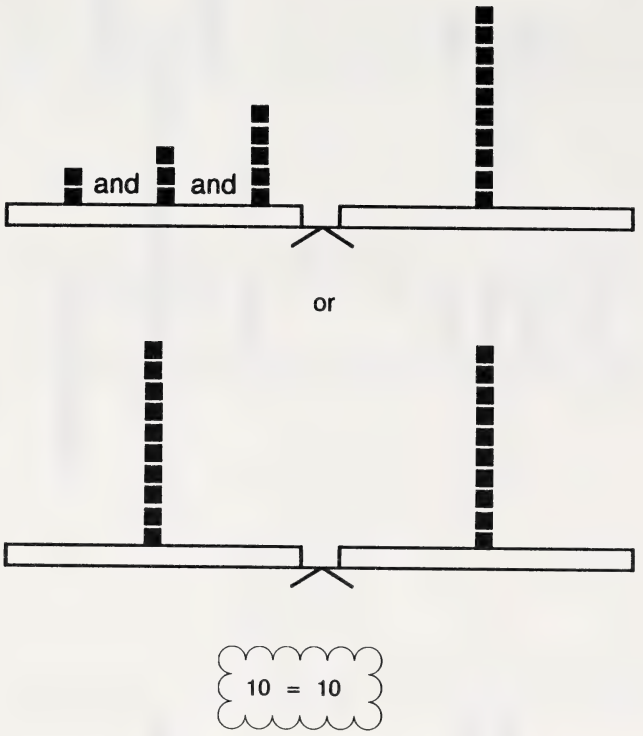
c. $4 + 3 + 2 = 3 \times 3$



2. Model these equations using the cut-out equation scale and cut-out operation cards in the appendix, and the units from a set of base 10 blocks. Then perform the operations to verify that the scale is balanced.

   a. 2 + 3 + 5 = 10

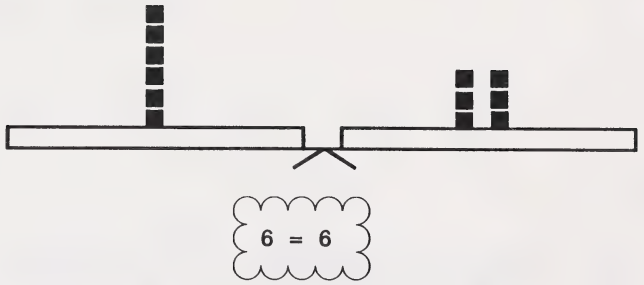
2. a.



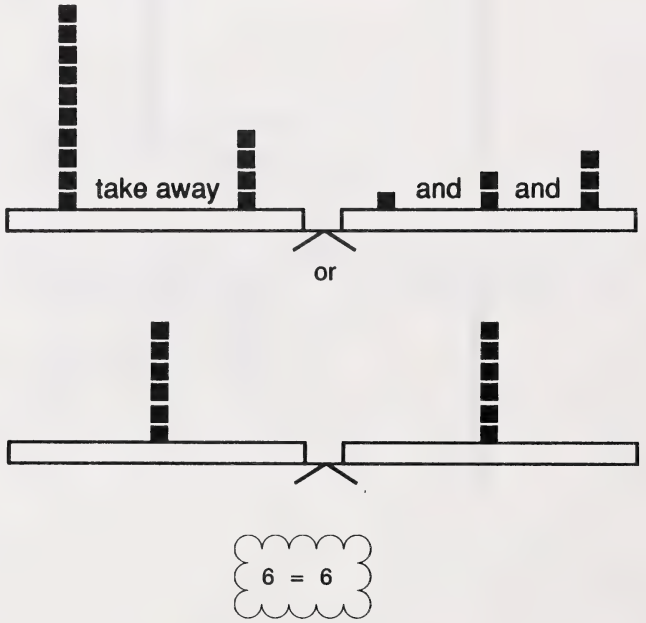
b. $6 = 2 \times 3$

c. $10 - 4 = 1 + 2 + 3$

b.



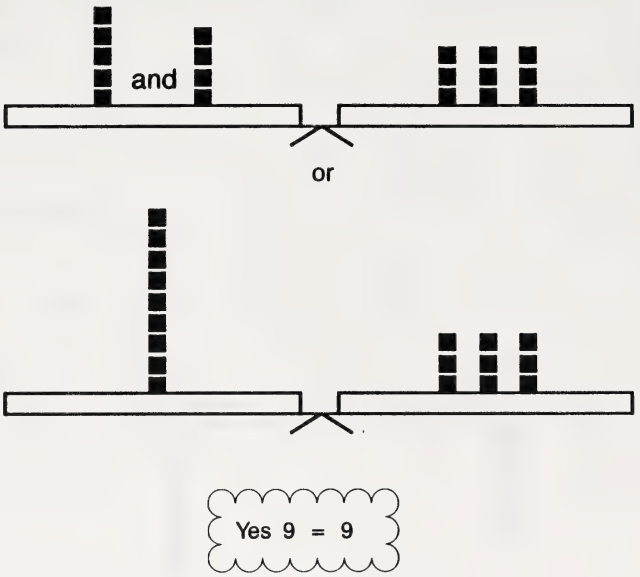
c.



3. Are the following equations? Answer yes or no and explain why.

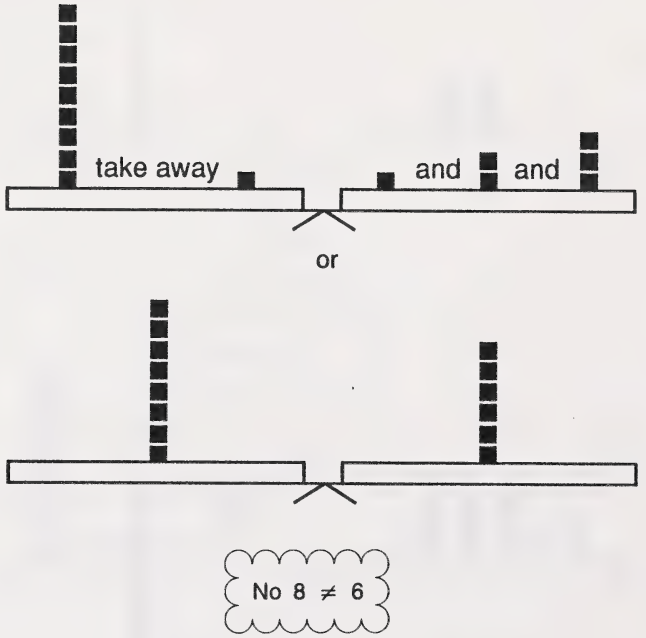
   a. $5 + 4 = 3 \times 3$

3. a.



b. $9 - 1 = 1 + 2 + 3$

b.



4. Write several equations to show the relationship between 3, 5, and 8.

4. $8 = 5 + 3$
$3 + 5 = 8$
$8 - 5 = 3$
$3 = 8 - 5$
$8 - 3 = 5$
$5 = 8 - 3$

Guiding the Student

- Have the student read "Working Together" and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

Express each of the following as an equation.

1. Four oranges plus seven oranges results in eleven oranges.
2. Six shirts less than eight shirts is the same as two times one shirt.
3. You can buy five hamburgers with $4 if each burger costs $0.80.
4. You receive $3.02 from $5 if the purchase cost is $1.98.
5. Vlad's mass was 80 kg. He lost 10 kg and now his mass is 70 kg.

Suggested Answers

1. $4 + 7 = 11$
2. $8 - 6 = 2 \times 1$
3. $5 \times 0.80 = 4$
4. $5 - 1.98 = 3.02$
5. $80 - 10 = 70$

Guiding the Student

- Have the student read "Working Together" and do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

1. Translate the following. Use brackets where needed.

   a. The square of nine, minus three, results in seventy-eight.

   b. The square of, nine minus three, gives thirty-six.

   c. The sum of eight and two, times six is sixty.

   d. The sum of eight, and two times six equals twenty.

Suggested Answers

1. a. $9^2 - 3 = 78$

   b. $(9 - 3)^2 = 36$

   c. $(8 + 2) \times (6) = 60$

   d. $8 + 2 \times 6 = 20$

2. Use brackets to make these statements true. The first one is done as an example.

a. $39 \div 4 + 9 = 9 - 5 + 1$

b. $27 + 9 \div 3 = 3 + 3 \times 2$

c. $29 - 4 \times 3 + 8 = 200 + 25 \times 3$

d. $17 - 18 \div 2 - 4 = 3 + 1 \times 3 - 8$

e. $1 \times 84 \div 1 + 5 = 5 \times 2 + 4$

2. a. $39 \div (4 + 9) = 9 - (5 + 1)$

b. $(27 + 9) \div 3 = (3 + 3) \times 2$

c. $(29 - 4) \times (3 + 8) = 200 + 25 \times 3$

d. $17 - 18 \div 2 - 4 = (3 + 1) \times 3 - 8$

e. $1 \times 84 \div (1 + 5) = 5 \times 2 + 4$

ALGEBRAIC EQUATIONS

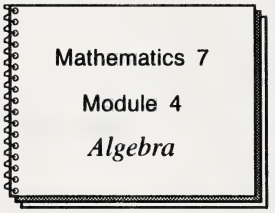
What Lies Ahead

In this section the student will translate English algebraic equations. The student will use learning aids to model algebraic.

The learning aids will also be used to solve equations and to verify the solutions.

Gathering Materials

The student will need these items for this section.



- base 10 blocks
- cut-out equation scale
- cylinders
- cut-out 'and' and 'take away' cards

Computer Drill & Instruction: Mathematics, Level D (SRA), Lesson 6 of Pre-Algebra disk.

Guiding the Student

- Have the student turn to Section 6 of the Module Booklet, and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

Print Alternative

1. Express each of the following as an equation.

   a. Alnoor's age minus two is seventeen.

   b. Three times Ruth's age gives eighteen.

   c. A number decreased by six is the same as four times eight.

   d. Jake's mass divided by nine is eight kilograms.

   e. Twelve less than four times the number of people in the room is fifty-six.

Computer Alternative

2. If you wish further practice translating a sentence into an equation, do Lesson 6 on the Pre-Algebra disk of *Computer Drill and Instruction: Mathematics, Level D* (SRA).

Suggested Answers

1. a. $a - 2 = 17$

   b. $3r = 18$

   c. $n - 6 = 4 \times 8$

   d. $j \div 9 = 8$

   or

   $\frac{j}{9} = 8$

   e. $4n - 12 = 56$

2. Computer-checked

3. Express the following as equations.

a. Marie has \$85 in the bank at the end of December. This amount is \$5 more than double the amount she had at the beginning of December.

b. Soccer practices last for 2 hours and Andrew missed 3 practices. Andrew spent 54 hours in team practices.

3. a. $85 = 2a + 5$

amount of money in bank at the beginning of December

b. $2n - 2 \times 3 = 54$

total number of practices

or

$54 + 2 - 3 = 2n$

total number of practices

c. The band has 12 people. If the choir gets one more person, there will be twice as many people in the choir as in the band.

c. $c + 1 = 2 \times 12$

number of people in the choir

Guiding the Student

- Have the student do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

Use the cut-out equation scale, operation cards, cylinders and base 10 blocks in the following.

1. a. Model $m + 2 = 7$.

b. Solve the equation. (Find the value that makes the equation true.)

Suggested Answers

1. a. Model $m + 2 = 7$.

b. To solve the equation, think

What number plus 2 is 7?

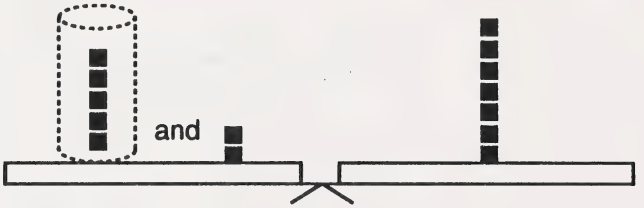
$\boxed{5} + 2 = 7$

So $m = 5$.

c. Verify the solution. (Test to check it is true for this value of the variable.)

2. a. Model $w - 3 = 8$.

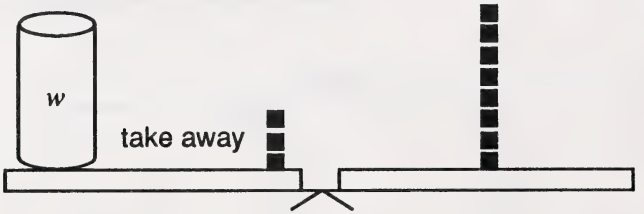
c. Verify the solution by replacing the cylinder with 5.



The result is 7 on both sides.

So $m = 5$.

2. a. Model $w - 3 = 8$.



b. Solve the equation.

c. Verify the solution.

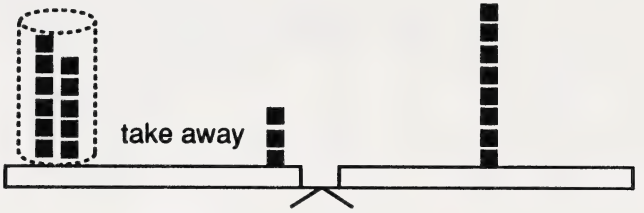
b. To solve the equation, think

What number minus 3 is 8?

$\boxed{11} - 3 = 8$

So $w = 11$.

c. Verify the solution by replacing the cylinder with 11.



The result is 8 on both sides.

So $w = 11$.

3. a. Model $4b = 8$.

b. Solve the equation.

c. Verify the solution.

3. a. Model $4b = 8$.

b. To solve the equation, think

4 times what number is 8?

$4 \times \boxed{2} = 8$

So $b = 2$.

c. Verify the solution. Replace b with 2.

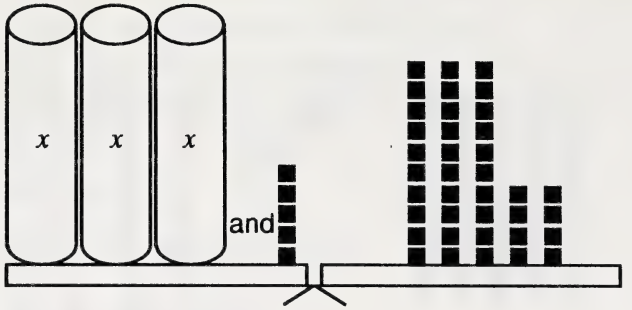
The result is 8 on both sides.

So $b = 2$.

4. a. Model $3x + 5 = 38$.

b. Solve the equation.

4. a. Model $3x + 5 = 38$.



b. To solve the equation, think

5 more than 3 times what number is 38?

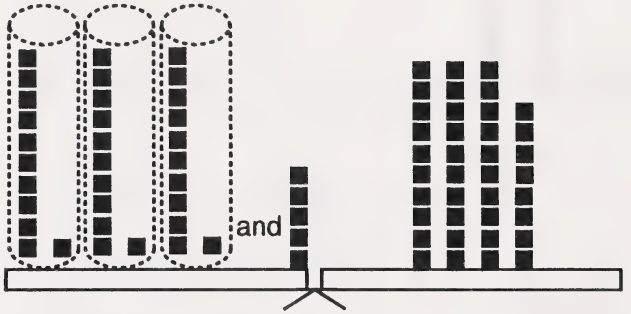
$3 \times \boxed{11} + 5 = 38$

So $x = 11$.

c. Verify the solution.

5. a. Model $4p - 2 = 50$.

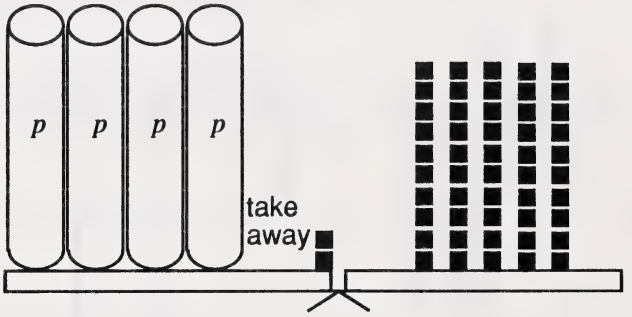
c. To check the solution, replace x with 11.



Both sides of the equation equal 38.

So $x = 11$.

5. a. Model $4p - 2 = 50$.



b. Solve the equation.

c. Verify the solution.

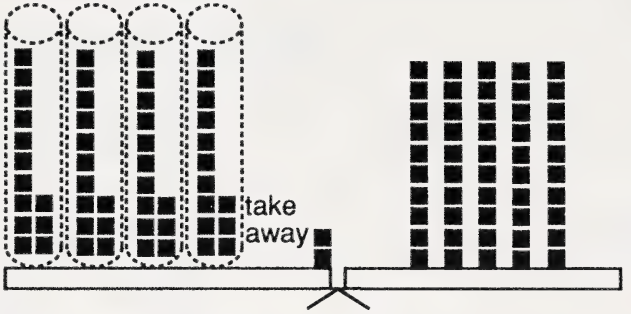
b. To solve the equation, think

8 less than 4 times what number is 50?

$4 \times \boxed{13} - 2 = 50$

So $p = 13$.

c. Verify by replacing p with 13.



Both sides equal 50.

So $p = 13$.

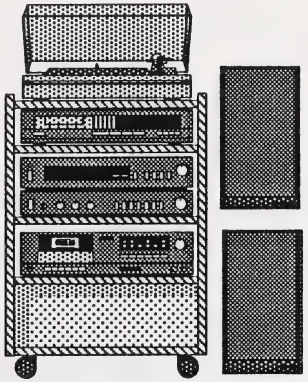
Guiding the Student

- Have the student read "Working Together" and do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

Write equations to describe these situations.

1. The stereo costs the money Stacey has saved plus $25.



2. Tuan's mass decreased by 10 kg equal Ruth's mass.

3. The sum of three whole numbers is 24.

4. The length of the house is 3 more than twice the width.

Suggested Answers

1. $c = s + 25$

2. $t - 10 = r$

3. $a + b + c = 24$

4. $\ell = 2w + 3$

Note

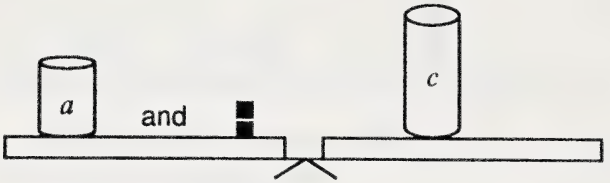
Different variables can be used.

Use equations scale, "and" and "take away" cards, cylinders and base 10 blocks in the following.

5. a. Model $a + 2 = c$.

b. Find 2 solutions.

5. a. Model $a + 2 = c$.



b. To solve the equation, think

What number plus 2 equals another number.

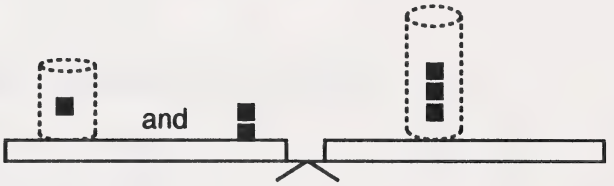
$\boxed{1} + 2 = (3)$
$\boxed{2} + 2 = (4)$
$\boxed{3} + 2 = (5)$

So $a = 1$ and $c = 3$.
Or $a = 2$ and $c = 4$.
Or $a = 3$ and $c = 5$.

Many other solutions are possible.

c. Verify the solutions.

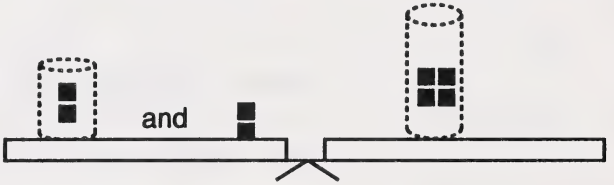
c. To verify the first solution, replace a with 1 and c with 3.



Both sides equal 3.

So $a = 1$ and $c = 3$.

To verify the second solution, replace a with 2 and c with 4.



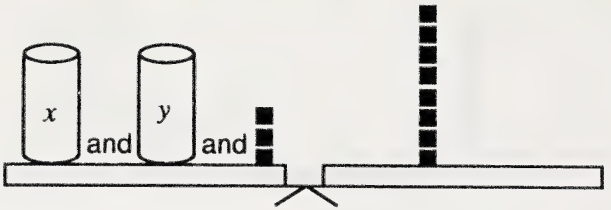
Both sides of the equation equals 4.

So $a = 2$ and $c = 4$.

6. a. Model $x + y + 3 = 8$.

b. Find 2 solutions.

6. a. Model $x + y + 3 = 8$.



b. To solve the equation, think

3 more than the sum of what two numbers is 8?

1 + (4) + 3 = 8
2 + (3) + 3 = 8
3 + (2) + 3 = 8

So $x = 1$ and $y = 4$.
Or $x = 2$ and $y = 3$.
Or $x = 3$ and $y = 2$.

Many other solutions are possible.

c. Verify the solutions.

c. To verify the first solution, replace x with 1 and y with 4.

Both sides of the equation equal 8.

So $x = 1$ and $y = 4$.

To verify the second solution, replace x with 2 and y with 3.

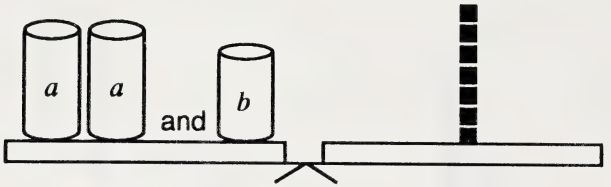
Both sides of the equation equal 8.

So $x = 2$ and $y = 3$.

7. a. Model $2a + b = 7$.

b. Find 2 solutions.

7. a. Model $2a + b = 7$.



b. To solve the equation, think

2 times what number plus what other number is 7?

$2 \times \boxed{3} + \textcircled{1} = 7$

$2 \times \boxed{2} + \textcircled{3} = 7$

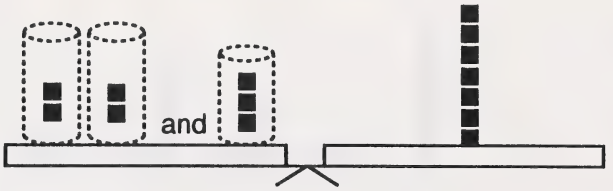
$2 \times \boxed{1} + \textcircled{5} = 7$

So $a = 3$ and $b = 1$.
Or $a = 2$ and $b = 3$.
Or $a = 1$ and $b = 5$.

There are many other solutions.

c. Verify the solution.

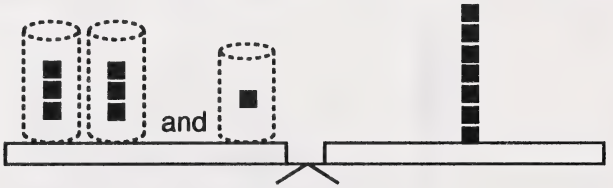
c. To verify the first solution, replace a with 3 and b with 1.



Both sides of the equation equal 7.

So $a = 3$ and $b = 1$.

To verify the second solution, replace a with 2 and b with 3.



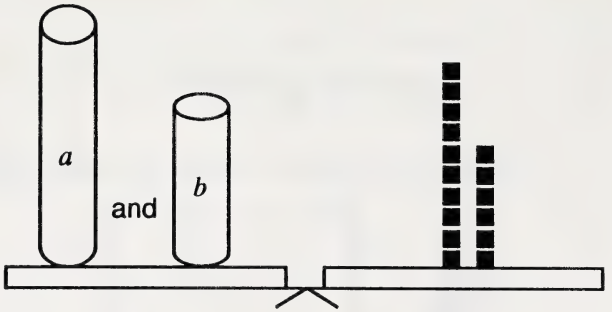
Both sides of the equation equal 7.

So $a = 2$ and $b = 3$.

8. a. Model $a + b = 16$.

b. Solve if a is 3 times b.

8. a. Model $a + b = 16$.



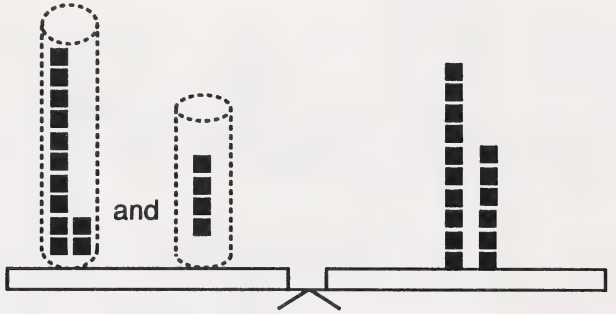
b. To solve the equation if a is 3 times b, use guess and check.

$\boxed{12} + (4) = 16$

So $a = 12$ and $b = 4$.

c. Verify the solution.

c. To verify the solution, replace a with 12 and b with 4.



Both sides of the equation equal 16.

So $a = 12$ and $b = 4$.

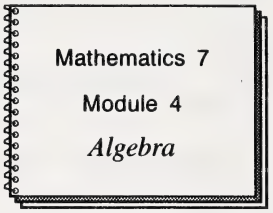
SOLVING EQUATIONS

What Lies Ahead

In this section the student will solve equations and verify the solutions without using learning aids.

Gathering Materials

The student will need this item for this section.



Guiding the Student

- Have the student turn to Section 7 in the Module Booklet and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

Solve each of the following by guessing and checking. Then verify each solution.

1. $12 + a = 15$

2. $20n = 200$

Suggested Answers

1. To solve $12 + a = 15$, think

12 plus what number is 15?

$12 + \boxed{3} = 15$

$a = 3$

Check

LHS	RHS
$12 + a$	15
$= 12 + 3$	
$= 15$	

LHS = RHS

So $a = 3$.

2. To solve $20n = 200$, think

20 times what number is 200?

$20 \times \boxed{10} = 200$

$n = 10$

Check

LHS	RHS
$20n$	200
$= 20 \times 10$	
$= 200$	

LHS = RHS

So $n = 10$.

3. $b - 5 = 7$

3. To solve $b - 5 = 7$, think

What number minus 5 is 7?

$\boxed{12} - 5 = 7$

$b = 12$

Check

LHS	RHS
$b - 5$	7
$= 12 - 5$	
$= 7$	

LHS = RHS

So $b = 12$.

4. $3a + 2 = 14$

4. To solve $3a + 2 = 14$, think

2 more than 3 times what number is 14?

$3 \times \boxed{4} + 2 = 14$

$a = 4$

Check

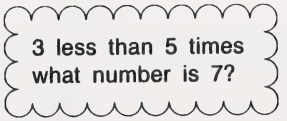
LHS	RHS
$3a + 2$	14
$= (3)(4) + 2$	
$= 12 + 2$	
$= 14$	

LHS = RHS

So $a = 4$.

5. $5a - 3 = 7$

5. To solve $5a - 3 = 7$, think



$5 \times \boxed{2} - 3 = 7$

$a = 2$

Check

LHS	RHS
$5a - 3$	7
$= 5(2) - 3$	
$= 10 - 3$	
$= 7$	

LHS = RHS

So $a = 2$.

Guiding the Student

- Have the student read "Working Together" and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

Write equations for the following. Then solve using guess and check method. Be sure to check the solution.

1. Five times the cost is 24.95. What is the cost?

2. The number of children in the class less three is 35. How many children are there in the class?

Suggested Answers

1. $5c = 24.95$

$5 \times \boxed{4.99} = 24.95$

$c = 4.99$

Check

LHS	RHS
$5c$	24.95
$= 5\ (4.99)$	
$= 24.95$	

LHS = RHS

So $c = 4.99$.

The cost is $4.99

2. $n - 3 = 35$

$\boxed{38} - 3 = 35$

$n = 38$

Check

LHS	RHS
$n - 3$	35
$= 38 - 3$	
$= 35$	

LHS = RHS

So $n = 38$.

There are 38 children.

3. Two times the number of goals plus four is 30. What is the number of goals?

3. $2n + 4 = 30$

$2 \times \boxed{13} + 4 = 30$

$n = 13$

Check

LHS	RHS
$2n + 4$	30
$= 2 \times 13 + 4$	
$= 26 + 4$	
$= 30$	

LHS = RHS

So $n = 13$.

The number is 13.

Guiding the Student

- Have the student do the Concluding Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Concluding Activities

Write an equation for the following. Then solve using guess and check methods. Verify the solutions.

1. Matt is eight years older than Jon. Together their ages total 29 years. How old are they?

2. The sum of two consecutive whole numbers is 25. What are the whole numbers? (Consecutive numbers are in order.)

Suggested Answers

1. $m + j = 29$

$\boxed{15} + (14) = 29$

$m = 15$

$j = 14$

Check

15 is one year more than 14 and

LHS	RHS
15 + 14 = 29	29

LHS = RHS

So $m = 15$ and $j = 14$.

Matt is 15 and Jon is 14.

2. $a + b = 25$

$\boxed{12} + (13) = 25$

$a = 12$

$b = 13$

Check

12 and 13 are consecutive numbers and

LHS	RHS
12 + 13 = 15	15

LHS = RHS

So $a = 12$ and $b = 13$.

The numbers are 12 and 13.

3. Stu answered 30 questions. He answered four times as many questions correctly as he did incorrectly. How many questions did he answer correctly?

3. $c + i = 30$

$\boxed{24} + \textcircled{6} = 30$

$c = 24$

$i = 6$

Check

24 is 4 times 6 and

LHS	RHS
$c + i$	30
$= 24 + 6$	
$= 30$	

LHS = RHS

So $c = 24$ and $i = 6$.

Stu answered 24 correctly and 6 incorrectly.

4. A 5.6 m rope is cut into two pieces. One piece is three times as long as the other. What are the length of the pieces?

4. $f + s = 5.6$

$\boxed{4.2} + \textcircled{1.4} = 4.6$

$f = 4.2$

$s = 1.4$

Check

4.2 is 3 times 1.4 and

LHS	RHS
$f + s$	5.6
$= 4.2 + 1.4$	
$= 5.6$	

LHS = RHS

So $f = 4.2$ and $s = 1.4$.

The first piece is 4.2 m and the second piece is 1.4 m.

DESCRIBING RELATIONS

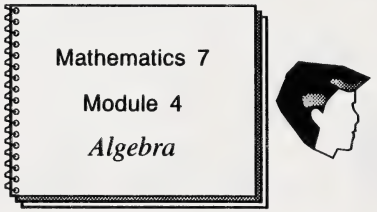
What Lies Ahead

In the summary the student will learn to describe a relationship between pairs of numbers by using words.

- writing an equation
- writing ordered pairs
- plotting points on a graph

Gathering Materials

The student will need these items for this section.



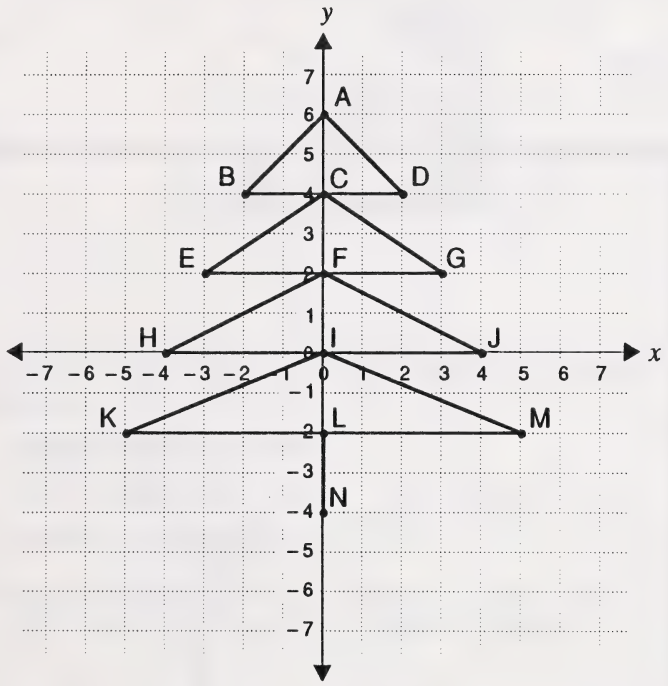
Computer Drill & Instruction: Mathematics, Level D SRA, Lesson 21 of Pre-Algebra disk.

Guiding the Student

- Have the student turn to Section 8 of the Module Booklet and read the "What Lies Ahead" box and the introductory paragraphs of "Working Together."
- Then have the student do the Introductory Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Introductory Activities

1. Write the coordinates of the points marked.

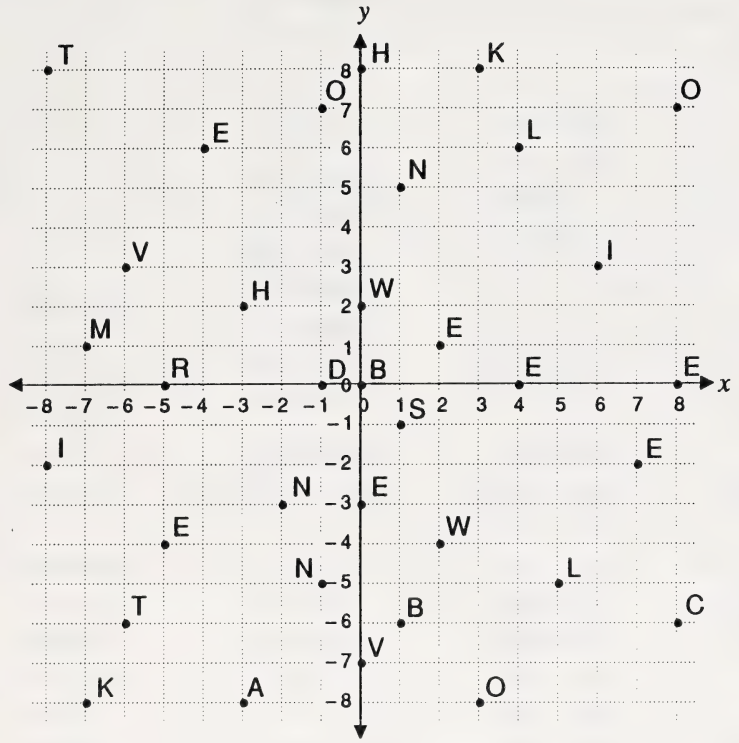


Suggested Answers

1.

Point	Coordinates
A	(0,6)
B	(−2,4)
C	(0,4)
D	(2,4)
E	(−3,2)
F	(0,2)
G	(3,2)
H	(−4,0)
I	(0,0)
J	(4,0)
K	(−5,−2)
L	(0,−2)
M	(5,−2)
N	(0,−4)

2. Each pair of numbers at the right of the page stands for a point on the coordinates below. Above each pair of numbers, write the letter that appears at that point.[1]



I		N	E	V	E	R
(6,3)		(1,5)	(−4,6)	(−6,3)	(4,0)	(−5,0)

K	N	E	W		W	E
(−7,−8)	(−1,−5)	(7,−2)	(2,−4)		(0,2)	(0,−3)

B	O	T	H
(0,0)	(8,7)	(−6,−6)	(−3,2)

L	I	V	E	D		O	N
(5,−5)	(−8,−2)	(0,−7)	(−5,−4)	(−1,0)		(3,−8)	(−2,−3)

T	H	E		S	A	M	E
(−8,8)	(0,8)	(8,0)		(1,−1)	−3,−8)	(−7,1)	(2,1)

B	L	O	C	K
(1,−6)	(4,−6)	(−1,7)	(8,−6)	(3,8)

[1]©1982 Creative Publications, Sunnyvale, California 94086.

3. Plot each ordered pair on the graph. Connect the points in order. A picture will develop[1].

Start
(−6, 6)
(−4, 6)
(−4, 10)
(−6, 10)
(−6, 6)
Lift pencil.

(−3, 5)
(−1, 5)
(−1, 10)
(−3, 10)
(−3, 5)
Lift pencil.

(−6, −4)
(−4, −4)
(−3, −3)
(−3, −1)
(−4, 0)
(−6, 0)
(−7, −1)
(−7, −3)
(−6, −4)
Lift pencil.

(0, 3⅓)
(1⅓, 3⅓)
(1⅓, 2⅔)
(2⅔, 2⅔)
(2⅔, 2)
(5⅓, 2)
(5⅓, 10)
(4, 10)
(4, 11)
(0, 11)
(0, 3⅓)
Lift pencil.

(10, −4)
(12, −4)
(13, −3)
(13, −1)
(12, 0)
(10, 0)
(9, −1)
(9, −3)
(10, −4)
Lift pencil.

(−9, 0)
(−7, 0)
(−7, 1)
(−3, 1)
(−3, 0)
(6, 0)
(6, −2)
(8, −2)

(8, 0)
(9, 0)
(9, 1)
(13, 1)
(13,3)
(11, 3)
(11, 5)
(6, 5)
(6, 11)
(4⅔, 11)
(4⅔, 12)
(−7⅔, 12)
(−7⅔, 11)
(−9, 11)
(−9, 7)
(−8, 7)

(−8, 6)
(−7, 6)
(−7, 5)
(−6, 5)
(−6, 2)
(−8, 2)
(−8, 1)
(−9, 1)
(−9, 0)
Lift pencil.

(7, 5)
(7, 6)
(8, 6)
(8, 5)
Lift pencil.

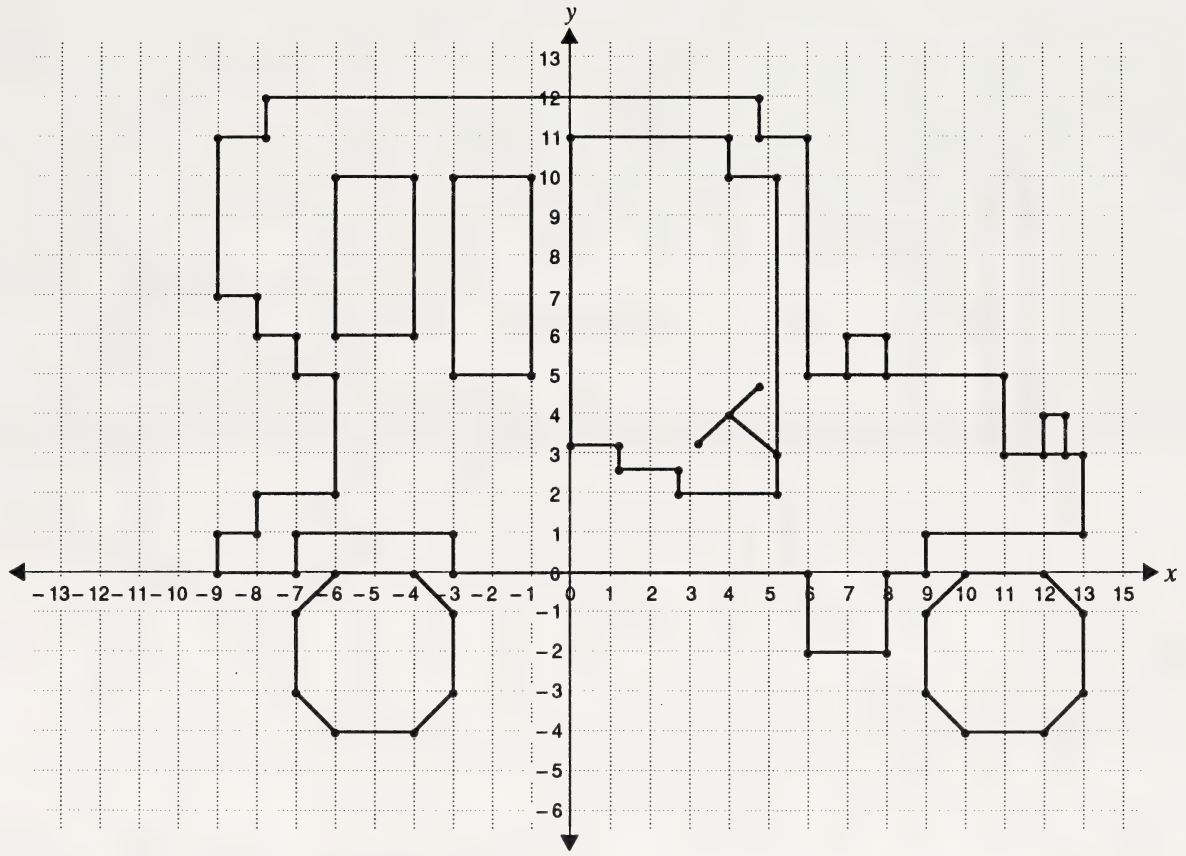
(12, 3)
(12, 4)
(12½, 4)
(12½, 3)
Lift pencil.

(5⅓, 3)
(4, 4)
Lift pencil.

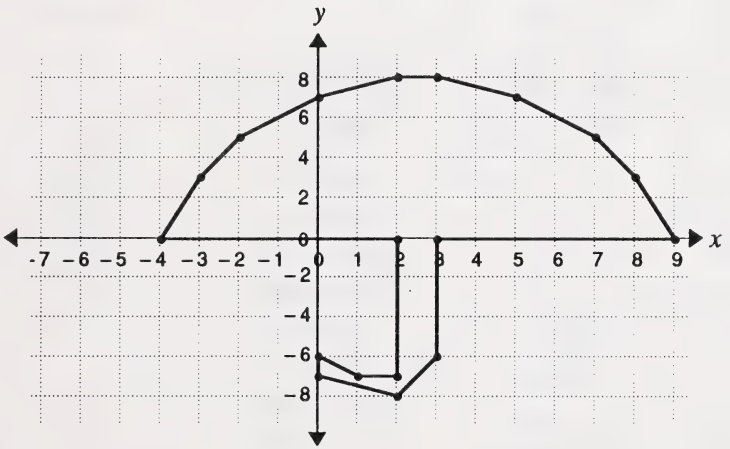
(4⅔, 4⅔)
(3⅓, 3⅓)
Stop

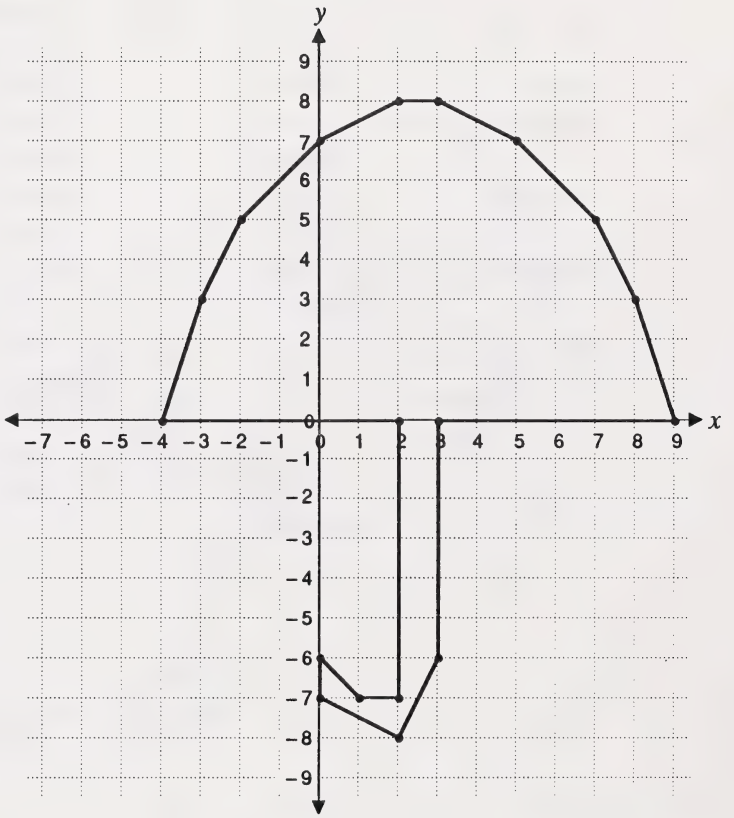
[1]*Arithmetic Teacher,* December, 1985.

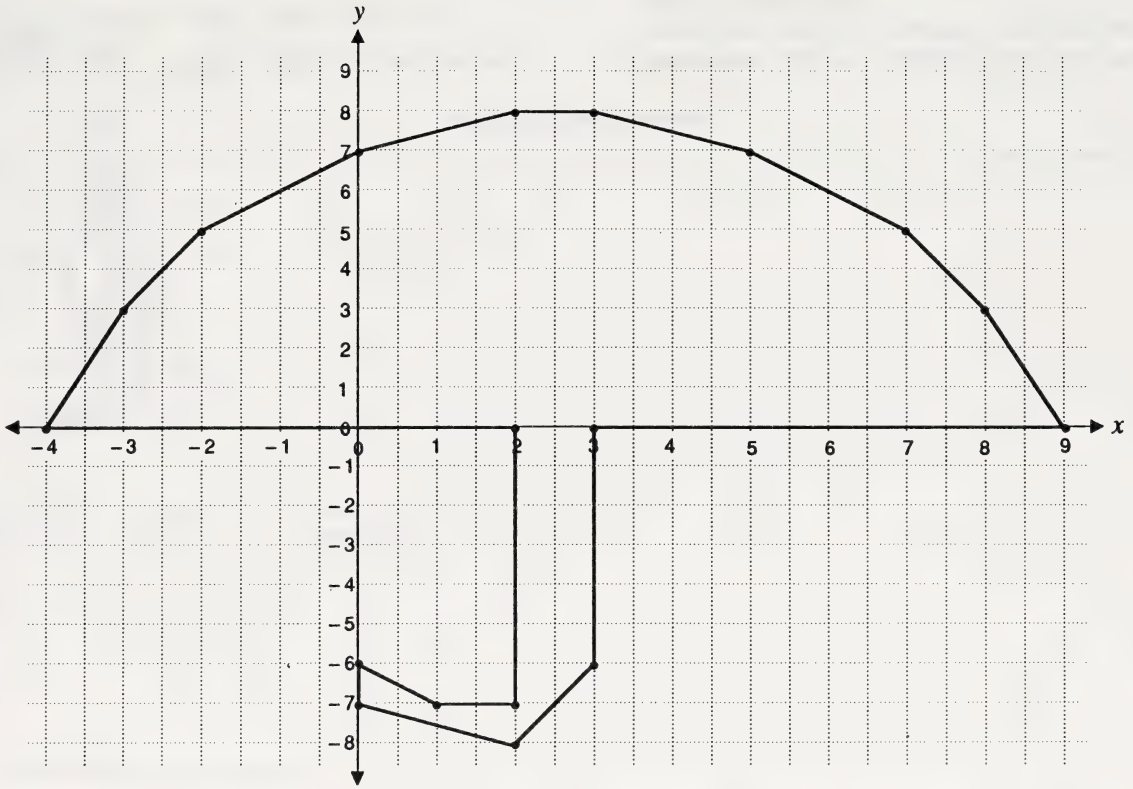
3.


y
x
13
12
11
10
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−13 −12 −11 −10 −9 −8 −7 −6 −5 −4 −3 −2 −1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 15

4. Plot these points on the 3 number planes provided. Join the points in order. $(-4,0)$, $(-3,3)$, $(-2,5)$, $(0,7)$, $(2,8)$, $(3,8)$, $(5,7)$, $(7,5)$, $(8,3)$, $(9,0)$, $(3,0)$, $(3,-6)$, $(2,-8)$, $(0,-7)$, $(0,-6)$, $(1,-7)$, $(2,-7)$, $(2,0)$, $(-4,0)$.






y
x
9
8
7
6
5
4
3
2
1
0
−1
−2
−3
−4
−5
−6
−7
−8
−4
−3
−2
−1
0
1
2
3
4
5
6
7
8
9

5. Why are the pictures in question 5 different?

5. The second picture is distorted. The third picture is wider because on the horizontal scale the scale is changed.

Guiding the Student

- Have the student read "Working Together" and do the Practice Activities.
- Afterwards help the student check the answers and correct any errors. Suggested answers are on the next page of this booklet.

Practice Activities

1. Janice likes to go horseback riding. How is the cost related to the riding time?

riding time in hours (t)	relation	cost in dollars (c)
1	$4 + 2 \times 1$	6
2	$4 + 2 \times 2$	8
3	$4 + 2 \times 3$	10
4	$4 + 2 \times 4$	12
5	$4 + 2 \times 5$	14

Describe the relationship several ways.

a. Write words to describe the relation.

b. Write an equation to describe the relation.

Suggested Answers

1. a. The cost is \$4 plus \$2 for every hour of riding time.

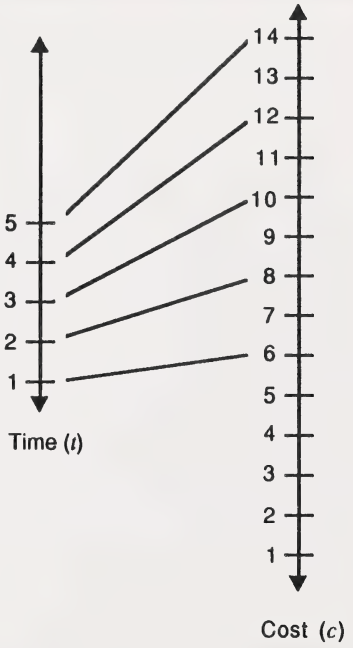
   b. $c = 4 + 2t$

c. Write the ordered pairs.

d. Describe the relationship using number lines.

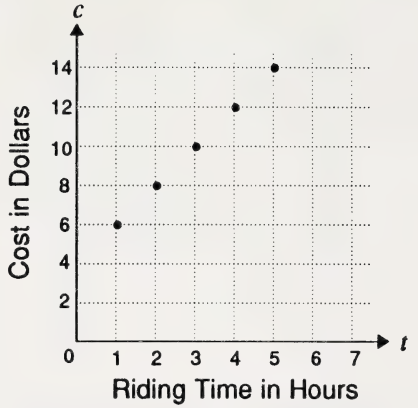
c. (1,6), (2,8), (3,10), (4,12), (5,14)

d.



e. Describe the relationship using a graph.

e.



2. How is Rajah's hourly pay related to Nadia's pay?

Nadia's pay (f)	relation	Rajah's pay (g)
5	5 − 1	4
6	6 − 1	5
7	7 − 1	6
8	8 − 1	7
9	9 − 1	8

Describe the relationship several ways.

a. Write words to describe the relation.

b. Write an equation to describe the relation.

c. Write the ordered pairs.

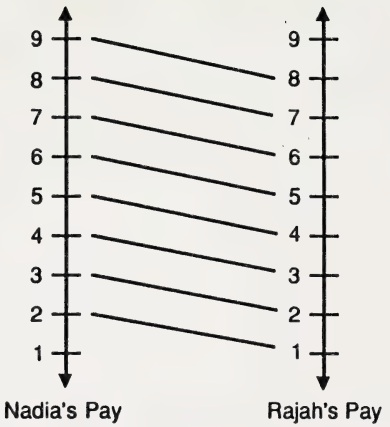
2. a. Rajah's hourly pay is \$1 less than Nadia's.

b. $r = n - 1$

c. (5,4), (6,5), (7,6), (8,7), (9,8)

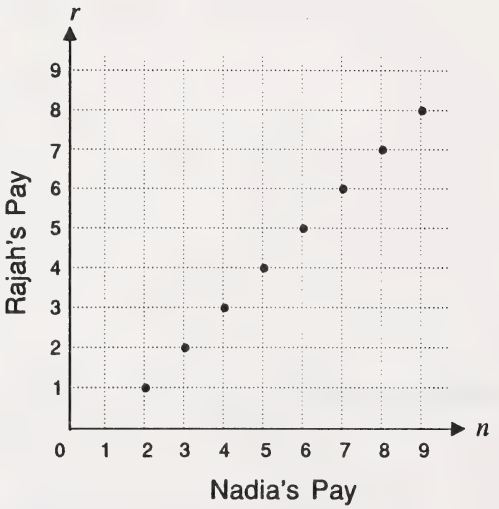
d. Use number lines to describe the relation.

d.



e. Use a graph to describe the relation.

e.



3. How is the length (metres) of the shed related to the width (metres)?

width in metres (w)	relation	length in metres (ℓ)
1	$2 \times 1 + 3$	5
2	$2 \times 2 + 3$	7
3	$2 \times 3 + 3$	9
4	$2 \times 4 + 3$	11
5	$2 \times 6 + 3$	13

Describe the relationship several ways.

a. Describe the relation using words.

b. Describe the relation using an equation.

c. Describe the relation using ordered pairs.

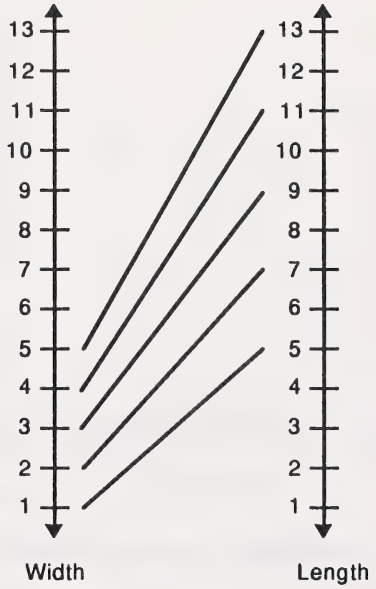
3. a. The length is twice the width plus 1 m.

b. $\ell = 2w + 1$

c. (1,5), (2,7), (3,9), (4,11), (5,13)

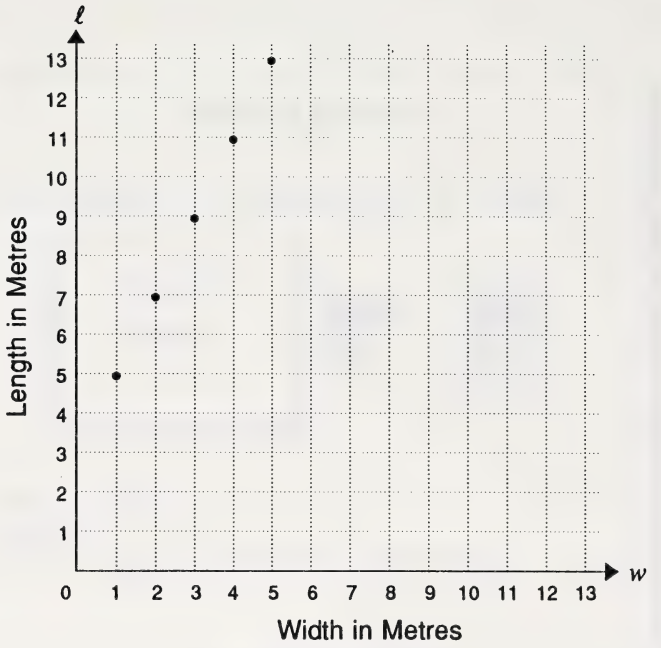
d. Describe the relation using number lines.

d.



e. Describe the relation using a graph.

e.



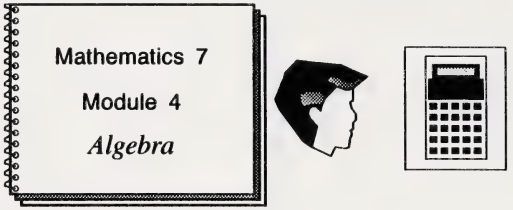
SUMMARY

What Lies Ahead

The summary helps the student to review what he or she has learned in the Module and prepare for the assignment in the Module Conclusion.

Gathering Materials

The student will need these items for this section.



- base 10 blocks
- cylinders
- cut-out equation scale and operation cards

Guiding the Student

- Have the student turn to Section 9 in the Module Booklet and read the Summary.
- After the student has reviewed the lists of skills learned and corrected any errors in the pretest, he or she is ready for the assignment in the Module Conclusion.

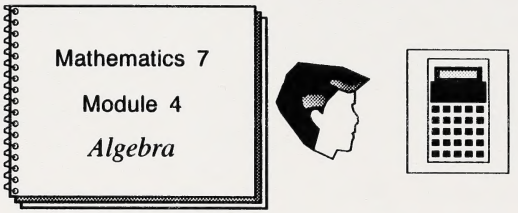
MODULE CONCLUSION

What Lies Ahead

The student is now ready to do the assignment in the Assignment Booklet. The student will be graded on the work done in this booklet.

Gathering Materials

The student will need the following items.



- base 10 blocks
- cylinders
- cut-out equation scale and operation cards

Guiding the Student

- Have the student complete the Assignment. The student may refer to the notes, but the Assignment must be done independently.
- Afterwards you should both sign the declaration and you should submit the Assignment for feedback and a grade.

Mathematics 7

9MA07P54

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